FAUNA OF THE CHILKA LAKE

ON SOME LEECHES FROM THE CHILKA LAKE.

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(*From the Zoological Laboratory, the Museums, Cambridge.*)

(With five text-figures.)

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ON SOME LEECHES FROM THE CHILKA LAKE.

By Tokio Kaburaki.

In his paper dealing with the leeches from the Chilka Lake, W. A. Harding[1] puts on record three species, viz. *Piscicola olivacea*, *Glossosiphonia heteroclita* and *Placobdella emydae*. Recently I have had the opportunity of examining a large collection of Indian leeches, in which some specimens from the same locality are included. On examination some of these proved to be of great interest on account of the hitherto undescribed species representing it. The following is a list of the species dealt with in this paper:—

Piscicola olivacea, Harding.
Piscicola caeca, n. sp.
Pterobdella amara, n. g., n. sp.
Glossosiphonia ceylanica, Harding.
Limnatis (*Poecilobdella*) *granulosa* (Savigny).

Of these species *Glossosiphonia ceylanica* appears to be identical with the form referred by Harding to the well-known leech *G. heteroclita* (Linn.), but it may be distinguished from this by some different characters as will be mentioned later. No examples of Harding's *Placobdella emydae* have been brought under my own observation.

Before proceeding further, I should like to express my hearty thanks to Dr. Sir A. E. Shipley for his suggestions in respect to the present investigation and to Dr. N. Annandale for the privilege of examining interesting material. My thanks are also due to Mr. W. A. Harding for his kind help in many respects, and to Professor J. S. Gardiner for allowing me the use of a table at the Zoological Laboratory.

Piscicola olivacea, Harding.

(Fig. 1.)

Numerous specimens of the species apparently identical with *Piscicola olivacea* are found included in the collection. This species generally occurs adhering to the body, or to the palate within the mouth, of fishes such as *Hypolophus sephen*, *Tetradon reticularis* and *Dorosoma indica* and appears to be fairly common in the Chilka Lake, it having been secured, besides the localities recorded by Harding, from several places, viz. in the neighbourhood of Mahosa, in the channel between the Satpur and Barhampur Islands, at the mouth of Barkul Bay, off Parikudh, and off the island in the bay beyond Grakala opposite to Kitrapal Village.

[1] Harding, W. A., 1920. Hirudinea. Fauna of the Chilka Lake. *Mem. Ind. Mus.*, Vol. V, p. 509.

As Harding states, there is little more to mention in respect of the external features of this species. The body, which commonly measures 8 mm. long, inclusive of the suckers, by 1 mm. across at the middle, is almost cylindrical, sometimes flattened and of nearly similar breadth for its greater length, though it considerably tapers forwards. On some occasions it shows a slight constriction a short distance in front of the genital opening, so that there can be distinguished a neck and a trunk. The anterior sucker is of a circular shape and rather less than half the posterior sucker, which is circular or oval in shape, the diameter being about 1 mm.

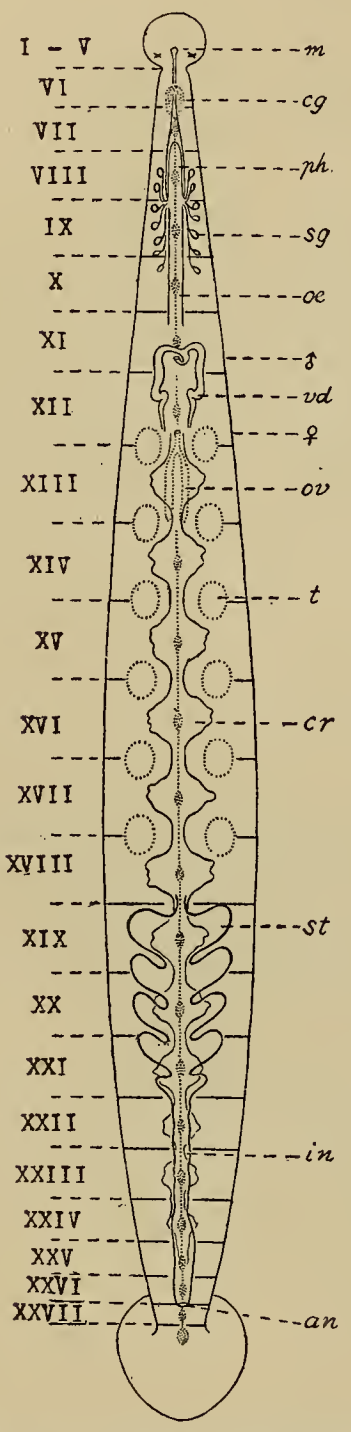

Fig. 1.—Diagrammatic representation of the organization of *Piscicola olivacea*, Harding, as seen from the dorsal side.

an = anus, *cg* = cephalic ganglionic mass, *cr* = crop, *in* = intestine, *m* = mouth, *oe* = oesophagus, *ov* = ovary, *ph* = pharynx, *sg* = salivary gland, *st* = stomach, *t* = testis, *vd* = vas deferens.

So far as I could count with certainty, the complete somite is, as described by Harding, made up of fourteen rings, and the eleven somites XIII-XXIII, according to Dr. Annandale's note, are each provided with a pair of pulsating vesicles, which in the preserved specimens have collapsed.

Dorsally situated on the anterior sucker are found two pairs of eyes which on each side lie so close together as to give the appearance of a single eye. The first pair are directed obliquely forwards, while the second pair are directed obliquely backwards.

The ground colour is subject to variation, generally being bright or pale olive green. Both dorsally and ventrally the body appears more or less dark brown on account of irregular pigments present all over in reticular distribution, leaving only a small space free on the mid-lateral sides of each somite. As has been mentioned by Harding, the anterior sucker shows three transverse pigment bands on the dorsal surface, one band following the junction with the body, one near the anterior tip and a third and broader one between the two, in the posterior part of the sucker, which contains the eyes. Medially these bands are traversed by a longitudinal band. The posterior sucker is marked with seven pairs of radiating pigment bands, corresponding to the seven somites of which it is composed.

The epidermis, as is well known in *Piscicola*, presents the most primitive arrangement of cells which are not closely packed. Below the epidermis, in the parenchyma, are found enormous quantities of pigments which are widely distributed as mentioned above.

Piscicola caeca, n. sp.

(Fig. 2.)

In his paper Harding puts on record a note upon a leech closely resembling *P. olivacea* in form and size but wholly destitute of eyes. To my mind, that note appears, however, to be partly applicable to the following new genus and species. The species described below is based upon the material which has been placed by him in my hands. The three specimens of this new species were found attached outside close to the junction of the skin and teeth on both upper and lower jaws of *Hypolophus sephen* which was collected about eight miles S.S.-W. of Kalidai in March, 1914. In the general collection is included an example of this species, which was procured near the landing stage at Rambha.

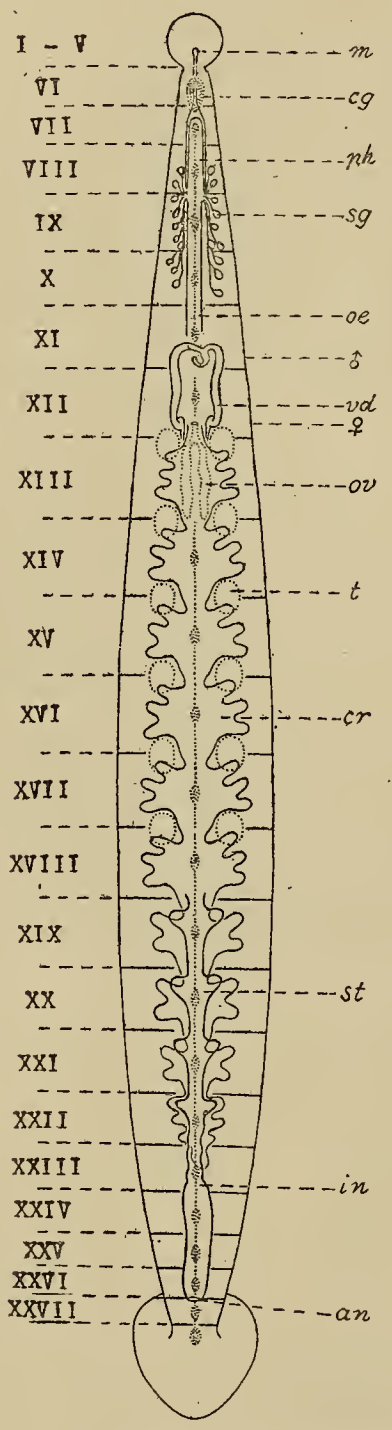

FIG. 2.—Diagram showing the organization of *Piscicola caeca*, n. sp., dorsal view. Index letters as in fig. 1.

The body is much flattened, slender and in the middle of a nearly uniform breadth, though it is attenuated more anteriorly than posteriorly. The anterior sucker is cup-shaped, almost circular and about half as broad as the posterior sucker, which is also circular or heart-shaped, measuring about 1 mm. in diameter. In the specimens examined I have been unable to demonstrate any trace of lateral pulsating vesicles. The worm measures 13 mm. in length, inclusive of the suckers, and about 1 mm. in breadth.

In the preserved specimens the rings are merged into irregular groups, and to obtain the correct number of them is extremely difficult. But a closer examination proves it to be grouped into twenty-one somites, each made up of fourteen rings.

This species is wholly devoid of eyes. No trace of eye-like organs could be demonstrated even in sections.

The ground colour is greyish white in spirit, wihout being marked with any trace of pattern. The crop is visible with more or less distinctness, owing to the ingestion of blood.

On the body-wall I have nothing peculiar to mention, excepting enormous quantities of unicellular glands which occur all over the body, just below the dermal musculature. These cells are round and far larger than those found in *P. olivacea*.

The organization agrees in the main with that of the preceding species. The

mouth is situated at about the middle of the anterior sucker, leading dorsally into the pharyngeal sheath which continues backwards through the cephalic ganglionic mass, extending into somite VIII. Within the sheath lies the pharynx which is of a short cylindrical shape and is supplied at the base with numerous ducts of the salivary glands. These glands are always unicellular and represent large and round cells, which are extensively distributed in the anterior parts of the body. Posteriorly the pharynx is continuous with the crop filled with blood. The crop represents a distensible part of the digestive tract, extending over ten somites XIII–XXII, without being divided into two branches, and giving off ten pairs of sub-divided lateral pouches which come off metamerically in these somites. Near the end of somite XVIII the crop gives rise dorsally to the stomach which bears four pairs of lateral pouches, a pair in each of somites XIX–XXII. The intestine extends through five somites, being distinguished by a slightly winding proximal part and a simple wide distal part, opening dorsally at the anus just between somites XXVI and XXVII.

The coelome, though resembling that of the preceding species, is considerably reduced, and no trace of lateral pulsating vesicles could be detected even in sections.

Of the nephridia I have been unable to obtain any more insight than a few ducts in sections available.

The nervous system is very closely similar in its arrangement to that observed in *P. olivacea*, there being twenty-one ganglia in the ventral chain, not counting the cephalic and acetabular ganglionic masses. Each ganglion occupies a position in the middle of the corresponding somite. The cephalic ganglionic mass is, as usual, composed of six ganglia, chiefly situated in somite VI ; the acetabular mass is made up of seven ganglia.

The male genital aperture lies in somite XI, as it seems to me, between rings 79 and 80, leading into the tubular vestibulum. The female aperture is situated fourteen rings behind the male, in somite XII, being much smaller than the latter.

The six pairs of testes exist anterior to and partly below the first six pairs of the crop-pouches, appearing to lie intermetamerically in somites $\frac{\text{XII}}{\text{XIII}}-\frac{\text{XVII}}{\text{XVIII}}$. The testes on each side are connected by short vasa efferentia with the vas deferens which runs forwards and, after pursuing a somewhat tortuous course and dilating into a thick-walled glandular canal in somites XI and XII, opens in common with its fellow into the vestibulum as in the preceding species. Around the prostate is a large accumulation of glandular cells which make their way into its lumen.

The ovaries represent a pair of simple sacs lying in somite XIII, usually lateral to the ventral nerve chain. Before opening to the exterior they unite into a short common duct.

In the specimens examined there can be also observed, as in *P. olivacea*, a swelling of the body-wall, which occupies ventrally about one somite (XIII).

In spite of the entire absence of eyes and the reduction of the coelomic cavity this leech may be placed in the genus *Piscicola* Malm., on account of its great resemblance in external and internal features, as is evident from above. It is also

nearly allied to the genus *Platybdella* Malm., but it is distinguishable from this by the difference in the number of rings forming the complete somite as well as in some structural respects. It is, I think, better to regard this leech as a member of *Piscicola* occupying a position on the border between this genus and *Platybdella*.

Pterobdella amara, n. g., n. sp.[1]

(Figs. 3, 4.)

Some remarkably interesting examples appearing to represent a new genus and species were obtained near Kalidai and four miles E. ½ N. of Patsahanipur, from the mouth of *Hypolophus sephen* as well as near Manikpatna, from the mouth of *Trygon uarnak*. Usually they are to be found firmly adhering to the gums of their hosts..

This leech is of some resemblance in its features to Blanchard's *Piscicola elegans*[2] described by that author from Kiu-Kiang and Yang-tse-Kiang in China. The body is depressed anteriorly and almost cylindrical posteriorly. As is seen from Fig. 3, it presents a peculiar shape, being sharply divided into three distinct regions, each of which is on some occasions about one-third the entire length of the body, though the anterior region is usually shorter than the other. The two anterior regions are each provided with a pair of conspicuous lateral fin-like bodies, extending almost throughout the length of each region, while the posterior region is bare, without being marked with any trace of appendages. The anterior sucker is somewhat excentrically attached, nearly campanulate and much smaller than the posterior sucker, which is centrally attached and represents a thick circular disc, as is the case with *Pontobdella*, *Ichthyobdella* and *Ancyrobdella*, with the diameter about as broad as the posterior part of the trunk. The specimens from *Hypolophus* are large, measuring about 12 mm. long, inclusive of the suckers, by about 3 mm. across at the middle, while the examples from *Trygon* are much smaller, being about 10 mm. in length and 2. mm. in breadth.

Fig. 3.—*Pterobdella amara*, n. g., n. sp. Dorsal aspect.

A correct count of rings forming the trunk is almost an impossibility. So far as I have examined the posterior region of the body where the rings are more or less distinct, the complete somite appears to be formed of some fourteen rings, which are merged into irregular groups.

The ground colour is white, occasionally marked, according to Dr. Annandale's

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[1] Here I beg to express my indebtedness to Dr. H. A. Baylis of the British Museum for his suggestion of the generic name "Pterobdella."

[2] Blanchard, R., 1896. Description de quelques Hirudinées asiatiques. *Mèm. Soc. Zool. France*, T. IX.

note applicable to this leech, with numerous minute spots of faint pink on the dorsal surface.

The eyes are entirely absent. No trace of visual organs could be detected even in sections.

The epidermis consists of a layer of cells covered with a cuticle. Among the epidermic cells are, as is usual, glandular cells for the secretion of mucus. Immediately beneath the epidermis lies the dermal musculature which is strongly developed, consisting of two sets of fibres, outer circular and inner longitudinal. The circular muscles form a continuous sheet of great thickness, while the longitudinal muscles occur in distinct and thick bundles. Widely scattered in the parenchyma are numerous glands, which represent a large and round cell as is seen in *P. caeca*.

The mouth is placed in the centre of the anterior sucker, leading into the usual pharyngeal sheath, which extends backwards into about somite IX. Within the sheath lies the pharynx, which commences as a short slender and cylindrical tube just behind the brain. Opening into the posterior end are a pair of groups of the salivary glands, each group consisting of a bunch of numerous large gland-cells. The long oesophagus leads into the crop, which is produced laterally into five pairs of irregularly outbulged pouches in somites XV–XIX, the last of which connects with the stomach, without being prolonged posteriorly into a blind sac. The stomach is provided with four pairs of simple pouches, coming off somewhat metamerically in somites XX–XXIII. The intestine follows, and passes to the dorsally situated anus between somites XXVI and XXVII.

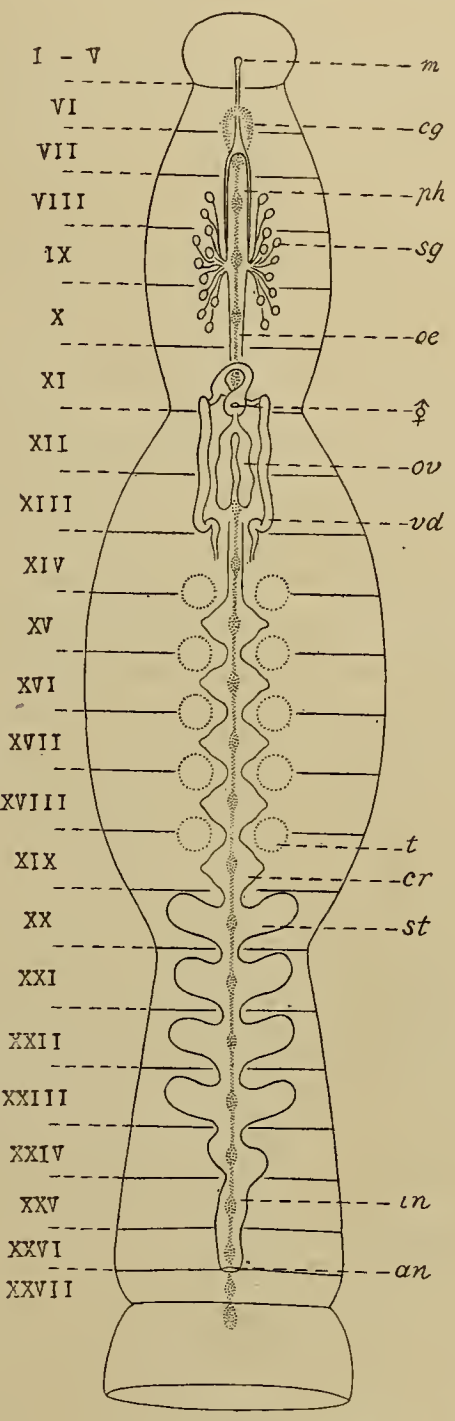

FIG. 4.—Diagrammatic representation of the organization of *Pterobdella amara*, as seen from the dorsal side. Index letters as in fig. 1.

The vascular system agrees in the main with that of *Pontobdella* and some others, the dorsal vessel being situated outside the dorsal sinus, but coming inside it occasionally. It becomes dilated in the anterior and middle regions of the body into a spacious sac to surround the pharynx and oesophagus with its coeca. In the region of the pharynx the dorsal coeca send out on each side lateral branches, communicating with the ventral vessel, where the latter forms a complete loop. In some sec-

tions of the middle parts of the body there can be found the connection of the dorsal vessel with the lateral vessels which in some parts give off branches running into the lateral fin-like bodies. The ventral vessel is simple for the greater part of its length usually inside the ventral sinus. Its posterior communication with the dorsal vessel could not be traced out, owing to my careless manipulation while sacrificing the body to the microtome. So far as my observation goes, the vascular system appears to be in communication, as in other Ichthyobdellids, with the coelomic cavity.

The coelome represents a system of very complicated sinuses, especially in the anterior two-thirds of the body. In the anterior region there is a large sinus which surrounds the pharynx and its sheath, the brain and nerve cords, and communicates on each side with lateral sinuses. This large sinus is divided in the middle region into two sinuses, dorsal and ventral, which connect with the lateral sinuses, after uniting into a common canal. The lateral sinuses in these two regions are widely spread in the lateral fin-like bodies, forming a system of anastomoses. They communicate with each other by metamerically arranged transverse canals just beneath the epidermis and thus form a complete circle. In the posterior region the arrangement of sinuses closely resembles that of *Pontobdella* and does not present any special features. No trace of pulsating vesicles could be detected even in sections. Judging from its arrangement and extension, the lateral sinus seems to play an important part in the respiratory function.

The nephridia, though seeming to be similar in their arrangement to those of *Pontobdella*, were not clearly made out in sections available.

The nervous system differs from that of the preceding two species in so far as the anterior ganglionic mass contains a ganglion more than ordinal. The cephalic ganglionic mass lies in somite VII, consisting, as in the case of *Ancyrobdella*, of seven ganglia, this is apparently due to the addition of the seventh ganglion. The acetabular mass is, as usual, composed of seven ganglia. Between these masses there are twenty ganglia which are metamerically arranged and joined by paired connectives. The ordinal position of the ganglion is in the middle of each somite. In the posterior end of the body, however, there can be noticed a slight centripetal displacement of the ganglia.

The common genital aperture lies in somite XI, directly leading into the wide, upwardly directed vestibulum of an irregular contour, which receives the male duct from the front as well as the oviduct from behind.

There are five pairs of testes, lying immediately in front of the five pouches of the crop; they are placed intermetamerically, as in the preceding two species, in somites $\frac{\text{XIV}}{\text{XV}}-\frac{\text{XVIII}}{\text{XIX}}$. The testes on each side communicate by short vasa efferentia with the vas deferens pursuing a tortuous course. In its course this duct becomes gradually dilated into a thick-walled glandular canal, which in front of the genital opening enters a large muscular, thick-walled and gland-covered "prostate," which soon unites with its fellow into a common duct, passing upwards and then backwards dorsally to open into the vestibulum.

The female organs consist of the usual pair of small ovarian sacs which communicate by a short narrow duct with the vestibulum.

This remarkable leech is nearly allied, as is evident from the above, to *Piscicola elegans* from China, but a closer examination has revealed the fact that it cannot be ranged under the genus *Piscicola*, as dealt by Blanchard with *elegans*. To my mind, a minute investigation of the latter species would necessarily result in its generic distinction from *Piscicola*. This leech is also closely allied to the genus *Trachelobdella* Diesing, but stands distinctly at variance from this in the general shape of the body, not to speak of other points of differences.

The following are the chief characters which distinguish this new genus *Pterobdella* founded on a single species.

Brackish water leeches, ectoparasitic on fish. Body smooth, formed of three distinct regions, of which the anterior two are flattened and each provided with a pair of lateral fin-like bodies ; but the posterior region is cylindrical, without pulsating vesicles. Anterior sucker nearly campanulate, excentrically attached ; posterior sucker circular, disc-like, centrally attached. Without eyes. Complete somite, though still uncertain, may be said to consist of some fourteen rings which are merged into irregular groups. Crop produced into five pairs of pouches, without posterior blind sac. Male and female genital organs opening in common. Testes five paired.

Glossosiphonia ceylanica, Harding.

(Fig. 5.)

The material was collected by Dr. Annandale and also by Dr. F. H. Gravely from the pond in the island of Barkuda. This leech was found occasionally attached to the body of *Rana cyanophlyctis*. At a glance some examples appeared to be identical with *G. heteroclita*, but a closer examination has revealed the fact that this is not so. After some hesitation I have referred it to Harding's *G. ceylanica*,[1] which has not been adequately described. This species appears to be fairly common in India, some examples being found in the general collection.

The body is nearly ovate-elliptical in contraction, and in some preserved specimens the head is seen separated from the trunk by a slight neck-like narrowing. No trace of papillae have I been able to demonstrate in the specimens examined. The anterior sucker lies on the ventral side of the head, within the limits of rings 1-6. The mouth occupies a position slightly anterior to the centre of the sucker. The posterior sucker is somewhat ventral in position and oval or circular in shape, the diameter measuring about 1 mm. The specimens measure about 8 mm. long by 2 mm. across at the middle of the body.

On the dorsal side seventy-one rings are counted in front of the posterior sucker. They are grouped into twenty-seven somites, of which somites I, XXVI and XXVII

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[1] Harding, W. A., 1909. Note on two new Leeches from Ceylon. *Proc. Camb. Phil. Soc.*, Vol. XV, Pt. III.

are uniannulate; somites II, III, XXIV and XXV biannulate; the twenty somites IV–XXIII are complete with three rings.

The six eyes are disposed in two close sub-parallel rows, as is the case with *G. complanata*. The first and smallest pair lie in ring 3. The second and larger pair occur in ring 4 but may be shifted somewhat further back and appear to extend into ring 5. The third pair are usually one ring behind the second, that is in ring 7.

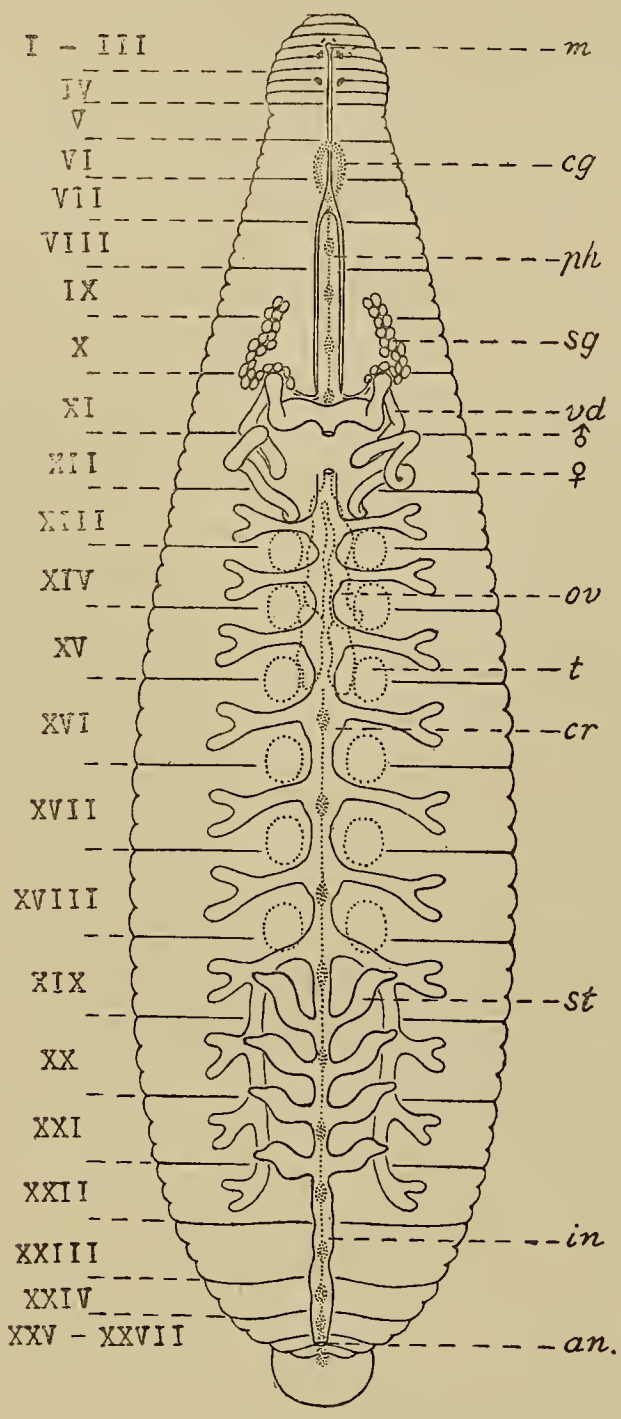

Fig. 5.—Diagram showing the organization of *Glossosiphonia ceylanica*, Harding, as seen from the dorsal side. Index letters as in fig. 1.

The colour in spirit is pale buff or pale grey, being marked with some three longitudinal rows of dark brown pigment patches, one in each half of the body and one median in position. The patches are arranged metamerically, marking the middle ring of each somite. Harding speaks of there being traces of four longitudinal brown stripes on the dorsal surface, but no trace of such stripes was shown in the specimens examined.

In structural respects the body-wall presents no noteworthy feature, being constructed in a similar manner to that found in other Glossosiphonids.

The mouth lying at the level nearly between the anterior two pairs of eyes leads into the pharyngeal sheath with the pharynx, which extends over about four somites VIII–XI. The salivary glands are closely aggregated into a compact group in each half of the body, the group lying symmetrically, within somites X and XI. The oesophagus represents a short passage connecting the base of the pharynx with the crop. The crop, differing from the general form of this genus, possesses seven pairs of lateral diverticulae, a pair arising in the middle of each of somites XIII–XIX. All of the first six pairs are usually bilobed distally, and each of the seventh pair is reflected posteriorly and extends into somite XXII, giving off four secondary lateral diverticulae, which come off metamerically in somites XIX–XXII. The stomach is pro-

vided with its four pairs of lateral diverticulae, lying within three somites XX–XXII. Posteriorly the stomach is continuous with the intestine which passes to the anus between somites XXVI and XXVII.

The vascular and coelomic systems, though not being traced out clearly, appear to be constructed on the same plan as in other Glossosiphonids.

The nephridia form several coils in their central portion and open out ventrally on the middle ring of the somite. The total number could not be definitely made out.

The cephalic ganglionic mass occupies two somites VI and VII, and consists, as usual, of the fused ganglia of the first six somites. Behind this there exist twenty-two distinct ganglia in the ventral chain, the last one representing the acetabular ganglionic mass. Each ganglion usually lies in the middle of the somite, though it is slightly displaced towards either end of the body.

The male genital aperture is placed between somites XI and XII. The female aperture is two rings behind the male, between the first and second rings of somite XII.

The six pairs of testes lie between the lateral diverticulae of the crop, intermetamerically in somites $\frac{XII}{XIV}-\frac{XVIII}{XIX}$. The vasa deferentia on each side proceed forwards, and, after, forming several coils in somites XI–XIII, unit in the median plane into a thick-walled common canal, the "prostate," opening to the exterior.

The ovaries are a pair of simple sacs extending over four somites XIII–XVI, and open in common as usual.

This leech may be placed in the genus *Glossosiphonia*, Johnson, with which it agrees in almost all of the diagnostic characters, excepting only the difference in the number of lateral diverticulae of the crop. In my opinion the difference may be regarded as being of not more than specific value.

Limnatis (Poecilobdella) granulosa (Savigny).[1]

This species, as is well known, is used for blood-letting in India and is very wide in its distribution, a considerable number of examples having been recorded by several authorities from Celebes, Sumatra, Borneo, Java, Cochin, Siam, China, India, Ceylon and elsewhere. In addition to a single individual from this lake, I have examined numerous examples from various parts of India, Ceylon and Burma, which are included in the general collection.

The body in the preserved condition is flattened and has a rough or granular appearance on both sides, owing to the presence of small closely-set papillae disposed transversely on the ring. In some cases the papillae are so small that a comparatively smooth surface is seen. This leech is of extremely varying size, the largest

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[1] Blanchard, R., 1893. Revision des Hirudinées du Musée de Turin. *Boll. Mus. Zool. Univ. d Torino*, Vol. VIII, No. 146. 1897a, Hirudinées du Musée de Leyde. *Notes from the Leyden Museum*, Vol. XIX. 1897b, Hirudinées des Indes Néerlandaises. *Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indian herausgegebenen von Dr. Max Weber.*

examples measuring about 160 mm. in length in front of the posterior sucker and 20 mm. in breadth at the middle of the body.

The anterior sucker presents a cup-shaped deepening on the ventral side of the head and is very rough, due to the presence of numerous minute papillae. The upper lip is divided on its inferior surface into two lobes by a longitudinal groove, at the base of which are found three small jaws arranged in the usual manner. The jaw is provided with numerous papillae and armed with a single row of numerous minute teeth.

The posterior sucker is of a circular shape, not wider than the greatest breadth of the body and also marked with some seven rows of transversely arranged papillae.

The rings are very conspicuous, on the dorsal side counting 102 in front of the posterior sucker, of which rings 6 and 7 are fused ventrally to form the posterior boundary of the anterior sucker. The same is true of rings 8 and 9. The last ring is pierced by the anus, thus showing signs of subdivision.

According to Oka's procedure[1] in determining the boundaries of somites, all the rings are grouped, as is usual, into twenty-seven somites, of which somites I, II, III and XXVII are uniannulate; somites IV, V, and XXVI biannulate; somites VI, VII and XXV triannulate; somites VIII and XXIV quadriannulate; the fifteen somites IX–XXIII are complete, consisting of five rings.

There are five pairs of eyes, lying, as in all species of *Hirudo*, respectively in rings 2, 3, 4, 6 and 9.

The segmental papillae are arranged, as has been stated by Blanchard, in eight dorsal and six ventral rows.

The male genital aperture is situated between rings 31 and 32, that is between the fourth and fifth rings of somite XI. The female aperture is five rings behind the male, that is between the fourth and fifth rings of somite XII.

The nephridial pores in some specimens could be somewhat easily demonstrated from the exterior. There are in all seventeen pairs, the pore lying in the furrow separating the second and third rings of somites VIII–XXIV.

The clitellum embraces the four somites X–XIII.

This species, as has been described by Blanchard (*loc. cit.*, 1897b) in detail, exhibits great variation in colour and markings, so that their differences are purely individual, and not such as to authorise even the distinction of "varieties." In the majority of cases the ground colour of the dorsal surface in spirit is a brownish olive with a slight touch of bluish grey. There are seven longitudinal rows of black patches, one median and three lateral on each side. The median stripe is sometimes of a dark brown colour and is in some cases continuous, the side of the median stripe extending almost throughout the whole length of the body. On each is seen a row of patches which mark in most instances the first and last rings of each complete

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[1] Oka, A., 1917. Hirudinea. Zoological Result of a Tour in the Far East. *Mem. Asiat. Soc. Bengal*, Vol. VI.

somite. The black patches forming the outer lateral stripes usually fall on the second and fourth rings, while those composing the inner lateral stripes are sometimes entirely absent. The ventral surface is generally a dull brown or a bluish grey, sometimes marked with marginal bands of a deep colour.